TEN RESEARCH PRIORITIES IN IRRIGATION MANAGEMENT

The ten subjects outlined below came to mind in answer to the question 'What do you consider to be research priorities in irrigation management?' One's answers to such a question are liable to be subjects which are intellectually exciting. There is no necessary one-to-one fit between intellectual fascination and utility. The ten subjects which follow are a compromise between what in my view would be most interesting, and what would be most useful. My criteria in selecting them have been:

(i) they represent intriguing gaps in knowledge and understanding

(ii) findings could have major practical significance either direct and early, or indirect and longer-term, for improving canal irrigation system performance.

I have not included researchability as a criterion. To assess that requires much thinking through and sharing of ideas.

The priorities refer to canal irrigation, not small-scale lift.

'Research' can mean many things. I am including:

(a) comparative analysis of secondary data (state of knowledge reviews and analysis, or even short opening up papers)

(b) workshops to focus on a subject

(c) new investigation

(d) R and D, including the development and testing of methodologies, and action research with monitoring and evaluation.

One or more apply in every case with follows, but not all apply in every case. The subjects are not in any conscious order of priority.

1. Research on Research: Error and Waste

I have never encountered a field where so much 'evidence' (from action research, pilot projects, official reports, and casual visits) is so seriously misleading. Astringent comparative analysis is long overdue to show how 'results' and subsequent beliefs and policies are distorted by specially privileged water supplies, input supplies and other special conditions. I fear that much of what we 'know' we do not really know because we have been misled. The starting point with research is to know what we do not know. Misleading methods and false findings need to be exposed and analysed comparatively.

Misleading or not, there is also an enormous volume of research the results of which will never be of any use. Hundreds, perhaps thousands, of scientists appear to be engaged in research (e.g. on crop water requirements) which adds to knowledge nothing but detail which will never be used. It is time the uselessness of this work was laid bare. It is a dreadful waste of scarce talent. Anyone conducting research on research might be encouraged to suggest remedial therapy and ways in which researchers could be retrained and redeployed to work on useful subjects, perhaps including some of those that follow.

2. Practical Analysis of Canal Irrigation Systems

The process of how one finds out about and analyses a canal irrigation system, whether to identify research priorities, to select where to do research, to examine one part or component of the system, or to seek optimal mixes, sequences and locations of actions to improve performance, is itself a largely unstudied subject. There seem to be three levels here:

(a) the analytical or mental model. Consciously or unconsciously, we all have analytical categories and relationships which we use for thinking about canal irrigation systems and examining them. There is also an objective reality of the system which can only be partially captured by our models. This is a gap in explicit description. A representation is needed which would better encompass and categorise the reality, provide a frame for analysis, and help in the search for priorities for research and action.

(b) procedures. These refer to how one finds out about, or sketches in for a particular system, the different parts of the mental model. The gap here is an algorithm or other procedure which enables one cost-effectively to move about in the model, identifying priorities for the next steps of investigation. In the case of actions to improve performance of irrigation systems, this would be a procedure for identifying subroutines (responding to rainfall, reducing waste of water at night, etc.) on which it would be best to concentrate.

(c) practical advice. Techniques of rapid appraisal and investigation need to be applied to canal irrigation systems and management in the search for approaches which will avoid error and waste in research and appraisal.

Taken together, these three levels invite a combination of analysis and methodological R and D, with sharing and comparison of experience. Considering how basic these activities of finding out and analysis are to all research and action, it verges on the bizarre that they have yet to be seriously studied and developed.

3. Improved Performance Through Main System Management

This would be a review of methods used and experience gained in improving performance through changes in main system management, especially scheduling. It is surprising, given the importance of the subject, that there is not by now a book of case studies based on good research into systems where there appear to have been improvements.

4. Scheduling: Options, Techniques, Communications, and Methods for Optimising

I hope I am missing something, but I have yet to see any detailed and comparative review or state of the art paper for South and Southeast Asian canal irrigation. Any such study should include water saving responses to rainfall on reservoir systems.

5. Farmer Rationality Analysis

Methods are needed for assessing feasible changes in water supply and farming practices which would be welcomed by farmers and at the same time socially beneficial. This applies in two common cases:

(a) where the aim is to issue less water in headreaches in order to pass more, in a more timely and predictable manner, towards the tails

(b) where the aim is to convert a second paddy crop or sugarcane to upland crops.

6. Irrigation Water at Night

Many irrigation staff work for only 8 hours out of 24. Except where it is very hot during the day (e.g. at times in Egypt) farmers prefer to irrigate during the day and not at night. Darkness in India (20 minutes after sunset to 20 minutes before sunrise) averages 11 hours 10 minutes, and is 13 hours in North India at midwinter. Perhaps 25 per cent of the canal irrigation water in India outside the Northwest is badly used or wasted at night. N.M. Joshi's pioneering work in Maharasthra has shown how water can be saved and waterlogging reduced through sluice and canal regulation to restrain night flows to field and drains. Much more needs to be known and understood about such experiences, and options and techniques for making better use of the water at present misapplied or wasted at night.

7. Farmers and the Main System

Especially in tail reaches, farmers are far more active above the outlet than is commonly recognised or acknowledged. They can be found variously making structures; maintaining channels (desilting, repairing breaches); carrying out works to capture water from rivers; negotiating with upstream (and downstream) communities and with local-level staff; raiding; guarding and patrolling; seeking information; and lobbying and making payments to staff and politicians, for which they organise to raise resources. Exceptionally, they are involved (as at Gal Oya and Minipe in Sri Lanka) in decision-making and discussion of a more formally institutionalised sort at various levels above the outlet, including the project level. Most work on farmers' participation has been on communals or below the outlet. Comparative analysis of practices, experience, and potential of farmer participation above the outlet might open up important new ways of achieving stable improvements in the performance of irrigation systems.

A subset of this subject is farmers' knowledge of the system above the outlet, their sources of information, and their expectations concerning water supply. Apart from more or less intelligent guesswork and inference, we seem to know very little about what farmers know and expect. This leads into communications to and with farmers. Productivity and equity on many irrigation systems might rise sharply if farmers knew, reliably, what water they would get and when.

8. Managers' Knowledge: Communications and Controls

It is often said that 'managers do not know what is going on in their systems', but I do not think there has been any comparative study of just what they know and do not know, how they receive and send communications, and how much control they exercise. To know what they know and do not know would provide a baseline for seeing how communications and controls could be improved.

9. The Outlet as Centre. Different outlet types have different implications for main system design and management, field channel design and layout, field level irrigation methods, and farmers' organisation and distribution of water. This leads into the fascinating subject of the relationships between main system management and water supply to the outlet and distribution and management of water below it. The design implications are important, especially in designing for subsequent management.

10. Simulation Games in Training

The potential for simulation games is increasingly recognised, but disappointingly little has been done during the past two years, despite one or two encouraging efforts. This is odd, since one would have supposed that some sorts of games using computers would have appealed to engineers and others. Everyone is talking about training and how important it is, but there is rather little new content to it. Simulation games, especially for (a) mananging main systems, and (b) playing tailend farmers, appear one good method which has so far been underexploited.

Whether these subjects could or should be taken up by IIMI is another question. IIMI cannot do everything. But whether the exploration is done by IIMI or other organisations or individuals, I have a private hope that all ten subjects will be energetically opened up during the next months and years. The long-term impact could be considerable.

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(Drafted 8 December 1984)
(Revised 16 December 1984)